

# Stress-Matched RF and Thermal Control Coatings for Membrane Antennas, Phase II

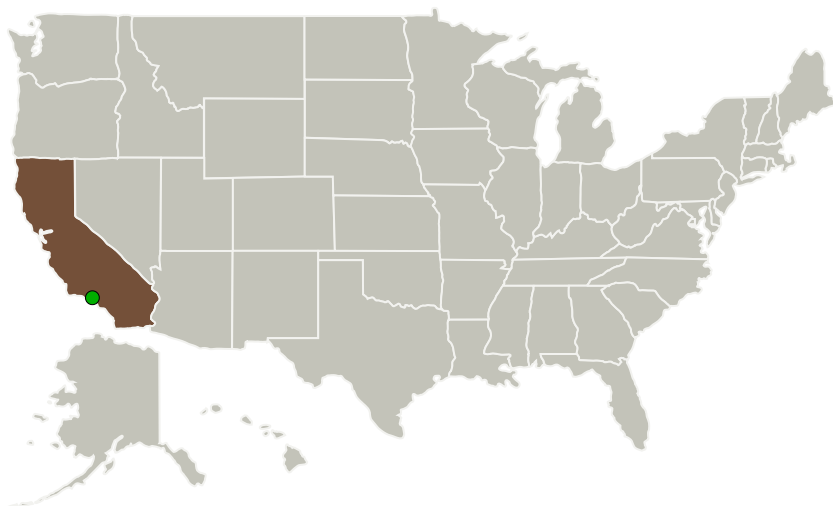
Completed Technology Project (2011 - 2013)



## Project Introduction

The development of multi-meter diameter radiofrequency (RF) antennas for NASA and DoD will have a significant impact of future space programs. Polymer membrane technologies are well suited for large area deployable space antennas by significantly reducing the mass and volume of the launch vehicle. Low CTE polymer piezoelectric membrane technology is now at a maturity level to enable the development of high performance large area electrically formal membrane reflectors. Advanced COATING technology is crucial to enabling technological developmental of high performance RF antennas. The production of a conductive and highly reflective thermal control COATING that matches the CTE of the polymer membrane is at the center of this development program. In addition, in Phase I, the piezoelectric polymeric membrane had a significant deformation at the application of the electrical potential - this manifested the need for stress balancing the coating. Specifically, the objective is to develop the thin-film stress-balanced COATING that will precisely match the CTE of the polymer to the coating material itself, resulting in a zero CTE membrane/coating composite structure. In addition, the coated membrane will exhibit the required RF performance, thermal characteristics, and environmental endurance, such as: atomic oxygen (AO) resistance; visible and ultra-violet (VUV) radiation rejection; and space temperature extremes. Surface Optics Corporation (SOC) has considerable experience in producing RF/Thermal coatings and precisely controlled intrinsic stress thin-films; both are necessary to the success of this program. NeXolve is the partnering organization with SOC, providing the polymer membranes that have the appropriate piezoelectric formulation, surface properties, and zero CTE.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Surface Optics Corporation	Lead Organization	Industry	San Diego, California
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

## Primary U.S. Work Locations

California

## Project Transitions

▶ **June 2011:** Project Start

✓ **May 2013:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140551>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Surface Optics Corporation

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

Carlos Torrez

### Principal Investigator:

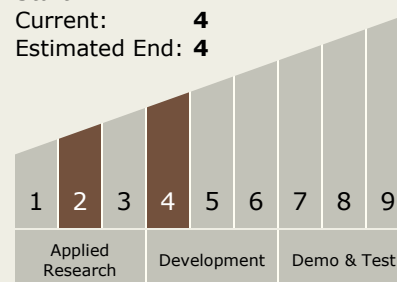
Michael Fulton

## Technology Maturity (TRL)

Start: 2

Current: 4

Estimated End: 4



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## Technology Areas

### Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - └ TX05.2 Radio Frequency
    - └ TX05.2.6 Innovative Antennas

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System